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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/243,689	02/03/1999	RICHARD M. WASSERMAN	101473	2795

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2123	22

DATE MAILED: 09/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Apq

Office Action Summary	Application No.	Applicant(s)	
	09/243,689	WASSERMAN, RICHARD M.	
	Examiner	Art Unit	
	Eduardo Garcia-Otero	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *45-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *45-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION: Final Action

Introduction

1. Title is: HARDWARE SIMULATION SYSTEMS AND METHODS FOR VISION INSPECTION SYSTEMS
2. First named Inventor is: WASSERMAN.
3. Claims 45-72 of US Application 09/243,689 filed on 2/3/99, are presented for examination.
4. This Action is in response to Amendment filed 7/30/03.
5. The following claims are currently amended: 46, 48, 51-54, 61, 65, 69, and 71. The rejections for these claims are similarly amended.

Index and Definitions

6. **Stevenson** refers to "Modeling optical vision systems with innovative software" by Michael Stevenson et al., Vision Systems Design, January 1999, pages 29-35 (from IDS).
7. **Thomas** refers to US Patent 5,137,450 (from PTO form 892).

Remarks

8. WRITTEN DESCRIPTION, Remarks page 17-18. All prior 35 USC 112 first paragraph, written description, rejections are withdrawn due to Applicant's amendments and assertions.
9. INDEFINITE, Remarks page 18. The prior 35 USC 112 second paragraph rejection is withdrawn due to Applicant's amendment.
10. OFF-LINE PROGRAMMING. At Remarks page 18, Applicant unpersuasively asserts that Stevenson does not disclose the claim 45 term "off-line programming system for a machine vision system...".
11. The claim 45 rejection must be interpreted in the context of Stevenson as a whole. Stevenson page 29 states "Among the different types of available optical vision systems is one common goal: they all concentrate on producing high-quality images. By designing computer models of these systems, they can be readily fine-tuned or even constructed-a process that saves time, effort, and money." Note that the explicit purpose of Stevenson's "computer models" (simulations) is to "fine-tuned or even construct" actual physical optical vision systems. Said optical vision systems are typically computer controlled, and are typically taken off-line during programming. This discussion of "off-line programming" also applies to claims 55, 57, and 69.

12. CONTROL INSTRUCTION GENERATING PORTION. At Remarks page 18-19, Applicant unpersuasively asserts that Stevenson does not disclose the claim 45 and 55 term "a control instruction generating portion". Similar to the above discussion regarding claim 45, Stevenson explicitly discloses "fine-tuned or even construct" actual physical optical vision systems, and thus implicitly discloses generating control instructions to implement said fine-tuning. This discussion of "control instruction" also applies to claim 55.
13. LINK. At Remarks page 19, Applicant unpersuasively asserts that Stevenson does not disclose "how to link his image simulation engine to control a programming system for an actual machine vision". However, Stevenson clearly discloses linkage, see page 29 "simulated and analyzed", and "fine-tuned", and "one common goal... produce high quality images", and especially see page 32 "decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Thus, Stevenson intends for the designers to "link" (or apply) the simulation results to the actual vision system. Stevenson page 30 states "These features enable designers to visualize all the key elements of their system's optical performance".
14. Further, machine vision systems are typically computer controlled, therefore one of ordinary skill in the art would interpret Stevenson as disclosing programming the actual vision system to "produce high quality images" (Stevenson page 29) based upon the "proper" (Stevenson page 32) parameters as determined by the simulation of a model that incorporates "all the key elements of their system's optical performance" (Stevenson page 30). This "link" discussion applies to claims 45 and 55.
15. USER-ALTERABLE CONTROL ELEMENTS. At Remarks page 19, Applicant unpersuasively asserts that Stevenson does not teach or suggest "user-alterable control elements" which are "specific to the corresponding specific machine vision system". However, Stevenson page 30 states "These features enable designers to visualize all the key elements of their system's optical performance". Said "key elements" (Stevenson's term) appears to include "user-alterable control elements" (Applicant's term) such as "depth of focus" per Stevenson page 32. Additionally, Stevenson's term "fine-tuned" at page 29 appears to imply parameters that are easily alterable by the user. This "user-alterable" discussion applies to claims 45 and 55.

16. CURRENT STATE OF THE USER-ALTERABLE CONTROL ELEMENTS. At Remarks page 19, Applicant unpersuasively asserts that Stevenson does not disclose "generate at least one control instruction usable in an inspection program for the at least one object inspectable by the machine vision inspection system, based at least partially on the current state of the user-alterable control elements". Stevenson page 30 states "These features enable designers to visualize all the key elements of their system's optical performance", and page 29 states "fine-tuned". Thus, Stevenson's term "fine-tuned" includes modeling the current state of key elements, and adjusting these key elements (fine-tuning).
17. Further, one of ordinary skill in the art would be familiar with using the current state of the actual machine vision system as a benchmark for measuring improvements in performance, and also would be familiar with common simple simulation optimization search techniques such as altering a single parameter while holding the other parameters constant (a single variable search). This "current state" discussion applies to claims 45 and 65.
18. INTERFACES. At Remarks page 20, Applicant unpersuasively challenges the 35 USC 103 rejections by asserting that the user interface of an existing machine vision system cannot be "simply copied" to interface with the simulation system of Stevenson. This raises several interesting issues.
19. First, *In re Wands* (CAFC) 8 USPQ2d 1400, 1404 (9/30/1998) provides an 8 factor test for undue experimentation: "Factors to be considered in determining whether a disclosure would require undue experimentation...includes (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims".
20. Second, *White Consolidated Industries, Inc. v. Vega Servo-Control Inc.* (CAFC) 218 USPQ 961, 963 (7/25/83) states "in this case ... require from 1-1/2 to 2 manyears of effort, a clearly unreasonable requirement".
21. Third, Applicant accurately points out a number of substantial difficulties in attaching the user interface of an existing machine vision system to the interface of the system of Stevenson. Said attachment is not a trivial task, and may require several months of effort.

The Examiner's term "simply copying the user interface software modules" should be interpreted as "copying some of the user interface software modules". The Examiner's point is that development time may be saved by using as much of the actual existing user interface as possible. The rejections will be amended to state "copying some of the user interface software modules".

22. However, the Examiner believes that said attachment could be done in less than 1-1/2 manyears, and thus the attachment would not exceed the relatively bright line test of *White Consolidated.*

23. Fourth, Applicant points out that Stevenson uses "translators" to combine several commercial software packages (ASAP and Rhinoceros), and that this type of combination may be buggy, unreliable, and difficult to maintain. This argument has some merit, but there are also substantial advantages (time and money) to using existing software engines rather than developing a relatively complex simulation system from scratch. In fact, developing a complex vision simulation system from scratch would take more than 2 manyears.

24. Fifth, note that Applicant's assertions regarding attaching a user interface are a **two-edged sword**. If the Examiner determined that attaching a user interface of an existing machine vision system to the interface of the simulation system of Stevenson was extremely difficult (done in over 2 manyears), then the Examiner would also determine that the Applicant's specification was not enabling with respect to attaching an actual user interface to a simulation system. Note that the Applicant's specification has provided very little detail regarding said attachment. See Specification FIG 2 element 114 "User Interface Subsystem" and element 140 "Vision System Hardware Component Simulation System" and element 142 link.

25. TRAINING. At Remarks page 21, Applicant unpersuasively asserts that Stevenson is not useful for system training. Stevenson page 20 discloses a very detailed model for "Virtual simulation of optical vision systems" which combines several commercial software packages: ASAP and Rhinoceros. Thomas discloses flight simulation systems which emphasize "realistic" simulation, including an almost exact duplication of the user interface hardware. One of ordinary skill in the art would be motivated to combine Stevenson with Thomas in order to realistically train users for the optical vision systems. It would be

relatively easy to permanently fix (or temporarily freeze) any parameters in Stevenson that would not be user alterable (such as input lens parameters), and thus would not be applicable for training. Stevenson discloses a very detailed and complex simulation system, and thus inherently discloses simpler systems.

26. FOCUS-DEPENDENT IMAGES. At Remarks page 22, Applicant correctly asserts that Thomas has no need for focus-dependent images. However, Thomas does disclose user interactive training simulation of complex systems, including machine vision (although admittedly not including focus-dependent machine vision). Stevenson does disclose focus-dependent machine vision simulation. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time. Further, the actual user interface hardware may also be used in order to save time and money.
27. SUMMARY. Applicant is correct that attaching a user interface to a simulation model is not trivial. The Examiner will amend the rejections to delete the word "simple" from the rejection of claim 47. However, all 35 USC 102 and 35 USC 103 rejections are maintained.
28. Note that the following claims are currently amended: 46, 48, 51-54, 61, 65, 69, and 71. The rejections for these claims are similarly amended.

Claim Rejections - 35 USC § 102(a)

29. The following is a quotation of 35 U.S.C. 102(a) which forms the basis for the rejections under this section in this Office action: (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
30. **Claims 45, 46, 48, 49, 50, 52, 53, 55, 56 are rejected under 35 U.S.C. 102(a).**
31. Claim 45 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
32. Claim 45 is an independent "system" claim, with 5 limitations labeled A-E by the Examiner for clarity. Note that A has three subparts, B has 2 subparts, and E has 3 subparts. Said subparts are numerically labeled by the Examiner for clarity.

33. A1-**user interface... display a synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface.
34. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
35. A3-[user interface...] **input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."
36. B1-**hardware component simulation system... first portion... including a limited depth of field of the sense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
37. B2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
38. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system.

Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

39. D-**control instruction generating portion** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
40. E1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
41. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.
42. E3-**generate at least one control instruction** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
43. Claim 46 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
44. Claim 46 depends from Claim 45.

45. **includes at least one control instruction... determines that a focus dependent actual inspection image...** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Webster defines "depth of focus" as "the range of distances of the image behind a camera lens or other image-forming device measured along the axis of the device throughout which the image has acceptable sharpness". Thus, any part of an object positioned in the "depth of focus" will have "acceptable sharpness". Additionally, note page 34 states "every optical-vision system has unique values determining its formal range of best focus".
46. Claim 47 is rejected under 35 U.S.C. 103.
47. Claim 48 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
48. Claim 48 depends from Claim 45.
49. **the at least one control element that affects the focus of the synthetic image comprises at least one of a) a focusing control element... b) a motion control element** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that "light-source... position" implies that the light-source may be moved. Note that "imaging cameral position" implies that the camera position may be moved.
50. Claim 49 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
51. Claim 49 depends from Claim 45.
52. **plurality of lenses** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that if the physical system contained a plurality of lenses, then the analysis would inherently model the plurality of lenses. Further note that the use of lenses in series is well known in

the art (telescopes), and the use of swapping lenses in a system is also well known in the art (microscopes).

53. Claim 50 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
54. Claim 50 depends from Claim 45.
55. **displays a modified current focus dependent synthetic image in response to a modification of at least one of a) the current state of the user-alterable control elements...** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Claim 45 limitation A2 defines "user-alterable control elements" as "comprising at least one control element that affects the focus".
56. Claim 52 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
57. Claim 52 depends from Claim 45.
58. A-**a third portion operable to represent a current state of a lighting system of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
59. B-**the user alterable control elements comprise at least one control element that affects the apparent lighting in the synthetic image representative of an image acquired by the machine vision system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Stevenson's "decide the proper light-source intensity" inherently implies a control element that affects the apparently lighting.
60. C-**the off-line programming system is operable to generate the current focus-dependent synthetic image based on at least three of [1] a current state of the user alterable**

control elements, [2] the current lens system representative of the first portion [represent at least a current lens system... including a limited depth of field of the lens system], [3] the current state representation of the second portion [represent a current state of at least the relative position] and [4] the current representation of the third portion [represent a current lighting system] is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note Stevenson discloses all four of the sub-limitations (1 through 4). Further note that Stevenson's term "decide" means that Stevenson's listed factors are alterable, and that a current representation is generated based upon the current state of each factor.

61. Claim 53 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
62. Claim 53 depends from Claim 52.
63. **the at least one control element that affects the apparent lighting in the synthetic image comprises a user-alterable control element of the machine vision inspection system, such that the at least one control element that affects the apparent lighting in the synthetic image appears and operates substantially similarly in both the off-line programming system and the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that some of Stevenson's parameters apper to be user-alterable, such as light-source position, and imaging camera position. Also see Stevenson page 30 "These features enable designers to visualize all the key elements of their system's optical performance".
64. Claim 55 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
65. Claim 55 is an independent claim, with 6 limitations A-F. Limitation A has 2 subparts, C has 2 subparts, and F has 3 subparts.

66. A1-**user interface... display a synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface.
67. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
68. A3-[user interface...] **at least one control element... image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".
69. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."
70. C1-**hardware component simulation system... first portion... including a limited depth of field of the lense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
71. C2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
72. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source

intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

73. E-**control instruction generating portion** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
74. F1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
75. F2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.
76. F3-**perform an image inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".
77. Claim 56 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
78. Claim 56 depends from Claim 55, with one additional limitation

79. **generate at least one control instruction usable in an inspection program** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

Claim Rejections - 35 USC § 103

80. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

81. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

> Determining the scope and contents of the prior art.
> Ascertaining the differences between the prior art and the claims at issue.
> Resolving the level of ordinary skill in the pertinent art.
> Considering objective evidence present in the application indicating obviousness or nonobviousness.

82. Claims 47, 51, 52, 54, 57-72 are rejected under 35 U.S.C. 103(a) as being unpatentable.

83. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

84. Claim 47 depends from Claim 45.

85. Stevenson does not expressly disclose the additional limitation.

86. control element that affects the focus of the synthetic image appears and operates substantially similarly to a control element included in a user interface of the machine vision inspection system is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair.

87. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, copying some of the user interface

software modules into the simulation system would save developmental time. Further, the actual user interface hardware may also be used in order to save time and money.

88. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.
89. Claim 51 depends from Claim 45, with three additional limitations.
90. A-**graphical user interface including user-alterable control elements and an image display portion** is disclosed by Stevenson at the figure on page 29. Note the toolbars that form part of the graphical user interface.
91. Stevenson does not expressly disclose the remaining limitations.
92. B-**the user interface of the off-line programming system is substantially similar to the user interface of the machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair. If the actual system being replicated contained a graphical user interface, then the simulation trainer would also have a similar graphical user interface. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
93. C-**majority of the user-alterable control elements typically appear and operate substantially similarly in both the off-line programming system and the machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
94. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating

the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time. Further, the actual user interface hardware may also be used in order to save time and money.

95. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

96. Claim 54 depends from Claim 45, with four additional limitations.

97. B-**hardware component simulation system processes the input operation instructions in order to generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

98. Stevenson does not expressly disclose the remaining limitations.

99. A-**input operation instructions which are substantially similar to the... machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.

100. C-**the user-alterable control elements include elements operable to input image inspection operation instructions substantially similar to at least one control instruction usable in the inspection program** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.

101. D-**hardware component simulation system generates the current focus-dependent synthetic image... substantially similar to... the machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements.

The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.

102. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

103. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

104. Claim 57 is an independent claim, with 5 limitations A-E. Limitation A has 4 subparts, C has 2 subparts, and E has 3 subparts.

105. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

106. A3-[user interface...] **at least one control element... image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

107. A4-**majority of the user-alterable control elements typically appear and operates substantially similarly in both the machine vision inspection simulation system and the machine vision...** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including the control elements.

108. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

109. C1-**hardware component simulation system... first portion... including a limited depth of field of the lense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

110. C2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

111. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

112. E1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

113. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

114. E3-**perform an image inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

115. Stevenson does not expressly disclose the remaining limitations.

116. A1-**user interface substantially similar to the graphical user interface of the machine vision inspection system... display a synthetic image** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

117. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

118. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

119. Claim 58 depends from Claim 57, with one additional limitation.

120. **plurality of lenses** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated". The mathematics of multiple lenses in series is well known in the art, and common in telescopes. Additionally, swapping multiple lenses is well known in devices such as microscopes.

121. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

122. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

123. Claim 59 depends from Claim 57, with one additional limitation.

124. at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position] is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

125. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

126. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

127. Claim 60 depends from Claim 57, with 3 additional limitations.

128. **current state of a lighting system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging

camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

129. **at least one control element that affects the apparent** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

130. **based on at least three of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position] and the current state representation of the third portion [image inspection]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

131. Note that the Examiner is interpreting "third portion" as meaning "image inspection" in view of parent claim 57.

132. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

133. Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas and Official Notice of multiple lights.

134. Claim 61 depends from Claim 60, with 1 additional limitations.

135. **a plurality of lights of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field

of view, and CCD camera resolution". Although Stevenson does not explicitly disclose a plurality of lights, the Examiner takes Official Notice that multiple lights are often used in photography, and are necessary to clearly illuminate complex three dimensional objects. One of ordinary skill in the art of optical vision systems would be familiar with the use of multiple lights. Also note MPEP 2144.04(VI)(B). *In re Harza,* 274 F.2d 669, 124 USPQ 378, 380 (CCPA 1960) states "It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced".

136. The Applicant is entitled to traverse the official notice according to MPEP § 2144.03. However, MPEP § 2144.03 further states "See also In re Boon, 439 F.2d 724, 169 USPQ 231 (CCPA 1971) (a challenge to the taking of judicial notice must contain adequate information or argument to create on its face a reasonable doubt regarding the circumstances justifying the judicial notice)." Specifically, In re Boon, 169 USPQ 231, 234 states "as we held in Ahlert, an applicant must be given the opportunity to challenge either the correctness of the fact asserted or the notoriety or repute of the reference cited in support of the assertion. We did not mean to imply by this statement that a bald challenge, with nothing more, would be all that was needed". Further note that 37 CFR § 1.671(c)(3) states "Judicial notice means official notice". Thus, a traversal by the Applicant that is merely "a bald challenge, with nothing more" will be given very little weight.

137. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas and Official Notice to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

138. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

139. Claim 62 depends from Claim 57, with 3 additional limitations.

140. A-**user-alterable control elements [focus]... substantially similar to... the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this

situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

141. B-**generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution", and the displayed images at page 29 and page 30.

142. C-**generates the current focus-dependent synthetic image in a form which is operable with the at least one control element which is operable to perform an image inspection operation based on the current focus-dependent synthetic image to provide an off-line environment for training a part program based on a focus-dependent synthetic image that is substantially similar to an environment that is provided by the machine vision inspection system for training a part program based on a focus-dependent actual image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution", and Stevenson page 30 "These features enable designers to visualize all the key elements of their system's optical performance", and Stevenson page 29 "fine-tune".

143. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

144. Claim 63 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

145. Claim 63 depends from Claim 57, with 1 additional limitations.

146. **further comprising a control instruction generating portion, wherein the machine vision inspection simulation system is further operable to generate at least one control**

instruction usable in an inspection program for the at least one object inspectable by the machine vision inspection system, based at least partially on the current state of the user-alterable control elements is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Stevenson's term "decide the proper... " means that the simulated system is used to determine the "proper" settings or control instructions for the actual system.

147. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible, and then to operate the actual system at the optimum regions as found by the simulations. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

148. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

149. Claim 64 depends from Claim 57, with 1 additional limitations.

150. **external view representing the overall configuration of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

151. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

152. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

153. Claim 65 is an independent claim, with 4 limitations A-D. Limitation A has 2 subparts, B has 2 subparts, and D has 4 subparts.

154. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

155. B1-**hardware component simulation system... first portion... including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

156. B2-**hardware component simulation system... first portion... including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

157. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

158. D1-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

159. D2- **focus dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

160. D3-**displaying** is disclosed by Stevenson at page 29 figure and page 30 figures.

161. D4-**generating at least one control instruction... based at least partially on the current state of the user-alterable control elements [focus]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

162. A1-**user interface... display a synthetic image representative of an image acquired by the machine vision system** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine vision images such as radar acquired artificial horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

163. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

164. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

165. Claim 66 depends from Claim 65, with 1 additional limitation.

166. **altering the at least one control element that affects the focus of the synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

167. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

168. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

169. Claim 67 depends from Claim 65, with 1 additional limitation.

170. **displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

171. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

172. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

173. Claim 68 depends from Claim 65, with 1 additional limitation.

174. **at least one control element... image inspection operation** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

175. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

176. Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

177. Claim 69 is an independent claim, with 7 limitations A-G. Limitation A has 4 subparts, B has 2 subparts.

178. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

179. A3-[user interface...] **at least one control element... image inspection** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

180. B1-**hardware component simulation system... first portion... depth of field** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

181. B2-**second portion... relative position and the [third] portion... inspection** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

182. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

183. D-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

184. E-**focus-dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits

designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

185. F-**displaying the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

186. G-**operating at least one control element which is operable to perform an image inspection operation** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

187. Stevenson does not expressly disclose the remaining limitations (A1 and A4).

188. A1-**user interface... display a synthetic image representative of an image acquired by the machine vision system** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine vision images such as radar acquired artificial horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

189. A4-**majority of the user-alterable control elements [focus] and image processing tools typically appear and operate substantially similarly** is disclosed by Thomas at FIG 3. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including control elements and image processing tools.

190. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

191. Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

192. Claim 70 depends from Claim 69, with 1 additional limitation.

193. **displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

194. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

195. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

196. Claim 71 depends from Claim 69, with 1 additional limitation.

197. **focus-dependent synthetic image on the current state representation of the third portion [lighting]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

198. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

199. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

200. Claim 72 depends from Claim 69, with 1 additional limitation.

201. **inspection** disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

202. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

Conclusions

203. All prior 35 USC 112 rejections are withdrawn.

204. All pending claims stand rejected against prior art.

205. Stevenson discloses simulating optical vision systems in great detail, including importing CAD, lens focus effects, lighting, position, inspection and so forth. However, Stevenson does not explicitly address simulating the user interface systems (both hardware and software) that inherently form an integral portion a quality-control optical vision system.

206. Thomas discloses flight simulation systems which include an almost exact duplication of the user interface hardware, and include simulating machine vision (radar) on a heads-up display. Thomas discloses the importance of "realistic" simulation for training.

Response to Amendments or new IDS-FINAL OFFICE ACTION

207. Applicant's amendments or new IDS necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

208. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 7:00 PM.

209. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone numbers for this group are:

210. (703) 746-7238 --- for communications after a Final Rejection has been made;

211. (703) 746-7239 --- for other official communications; and

212. (703) 746-7240 --- for non-official or draft communications.

213. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

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KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER